





| charge in cfs |           |             | Cadmium Concentration Coefficients |      |               |
|---------------|-----------|-------------|------------------------------------|------|---------------|
|               | Intercept | coefficient |                                    | B    | Intercept     |
|               | Runoff    |             | Low Flow November-March            |      |               |
| M34           | -2.771    | 0.394       | -2.28954                           | A72  | 0.000 1.51469 |
| CC48          | 1.752     | 0.130       | 6.77165                            | M34  | 0.004 0.09818 |
| A68           | -11.131   | 0.498       | -3.62869                           | CC48 | 0 2.49092     |
|               |           |             |                                    | A68  | 0 1.82408     |
|               |           |             |                                    |      |               |

Discharge Relationships among the three gages

| MONTH        | J  | F  | M  | A   | M   | J    | J   |
|--------------|----|----|----|-----|-----|------|-----|
| Intercept    | 1  | 1  | 1  | 1   | 1   | 1    | 1   |
| A 72         | 64 | 63 | 77 | 155 | 682 | 1196 | 624 |
| M34          | 22 | 22 | 28 | 58  | 266 | 468  | 243 |
| CC48         | 14 | 13 | 15 | 22  | 91  | 158  | 83  |
| A68          | 25 | 25 | 31 | 66  | 329 | 585  | 300 |
| Ground water | 3  | 3  | 3  | 9   | -3  | -14  | -2  |

1/(1+BQ) Discharge Representation

|      |        |        |        |        |        |        |        |
|------|--------|--------|--------|--------|--------|--------|--------|
| A 72 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| M34  | 0.9175 | 0.9188 | 0.9008 | 0.8110 | 0.4847 | 0.3481 | 0.5072 |
| CC48 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| A68  | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |

Date variables

|         |        |        |         |         |         |         |         |
|---------|--------|--------|---------|---------|---------|---------|---------|
| sin     | 0.1552 | 0.6358 | 0.9276  | 0.9887  | 0.7862  | 0.3629  | -0.1441 |
| cos     | 0.9879 | 0.7719 | 0.3737  | -0.1496 | -0.6180 | -0.9318 | -0.9896 |
| sin1    | 0.3066 | 0.9815 | 0.6932  | -0.2959 | -0.9717 | -0.6763 | 0.2852  |
| cos1    | 0.9518 | 0.1916 | -0.7207 | -0.9552 | -0.2361 | 0.7366  | 0.9585  |
| Consent | 1      | 1      | 1       | 1       | 1       | 1       | 1       |

|     |           |        |        |         |         |         |         |
|-----|-----------|--------|--------|---------|---------|---------|---------|
| A72 | Intercept | 1      | 1      | 1       | 1       | 1       | 1       |
|     | BQ        | 1.0000 | 1.0000 | 1.0000  | 1.0000  | 1.0000  | 1.0000  |
|     | sin       | 0.1552 | 0.6358 | 0.9276  | 0.9887  | 0.7862  | -0.1441 |
|     | cos       | 0.9879 | 0.7719 | 0.3737  | -0.1496 | -0.6180 | -0.9896 |
|     | sin1      | 0.3066 | 0.9815 | 0.6932  | -0.2959 | -0.9717 | -0.6763 |
|     | cos1      | 0.9518 | 0.1916 | -0.7207 | -0.9552 | -0.2361 | 0.7366  |
|     | Consent   |        |        |         |         |         |         |

**A72 Concentration      0.9      1.3      2.0      2.4      2.2      1.6      1.1**

|     |           |        |        |         |         |         |         |
|-----|-----------|--------|--------|---------|---------|---------|---------|
| M34 | Intercept | 1      | 1      | 1       | 1       | 1       | 1       |
|     | BQ        | 0.9175 | 0.9188 | 0.9008  | 0.8110  | 0.4847  | 0.3481  |
|     | sin       | 0.1552 | 0.6358 | 0.9276  | 0.9887  | 0.7862  | -0.1441 |
|     | cos       | 0.9879 | 0.7719 | 0.3737  | -0.1496 | -0.6180 | -0.9896 |
|     | sin1      | 0.3066 | 0.9815 | 0.6932  | -0.2959 | -0.9717 | -0.6763 |
|     | cos1      | 0.9518 | 0.1916 | -0.7207 | -0.9552 | -0.2361 | 0.7366  |
|     | Consent   | 1.0000 | 1.0000 | 1.0000  | 1.0000  | 1.0000  | 1.0000  |

**M34 Concentration      1      1      1      1      1      1      0**

|                        |              |          |          |          |          |          |          |          |
|------------------------|--------------|----------|----------|----------|----------|----------|----------|----------|
| CC 48                  | Intercept    | 1        | 1        | 1        | 1        | 1        | 1        | 1        |
|                        | BQ           | 1.0000   | 1.0000   | 1.0000   | 1.0000   | 1.0000   | 1.0000   | 1.0000   |
|                        | sin          | 0.1552   | 0.6358   | 0.9276   | 0.9887   | 0.7862   | 0.3629   | -0.1441  |
|                        | cos          | 0.9879   | 0.7719   | 0.3737   | -0.1496  | -0.6180  | -0.9318  | -0.9896  |
|                        | sin1         | 0.3066   | 0.9815   | 0.6932   | -0.2959  | -0.9717  | -0.6763  | 0.2852   |
|                        | cos1         | 0.9518   | 0.1916   | -0.7207  | -0.9552  | -0.2361  | 0.7366   | 0.9585   |
|                        | Consent      | 1.0000   | 1.0000   | 1.0000   | 1.0000   | 1.0000   | 1.0000   | 1.0000   |
| CC 48 Concentration    |              | <b>2</b> | <b>1</b> | <b>2</b> | <b>3</b> | <b>3</b> | <b>3</b> | <b>3</b> |
| A68                    | Intercept    | 1        | 1        | 1        | 1        | 1        | 1        | 1        |
|                        | BQ           | 1.0000   | 1.0000   | 1.0000   | 1.0000   | 1.0000   | 1.0000   | 1.0000   |
|                        | sin          | 0.1552   | 0.6358   | 0.9276   | 0.9887   | 0.7862   | 0.3629   | -0.1441  |
|                        | cos          | 0.9879   | 0.7719   | 0.3737   | -0.1496  | -0.6180  | -0.9318  | -0.9896  |
|                        | sin1         | 0.3066   | 0.9815   | 0.6932   | -0.2959  | -0.9717  | -0.6763  | 0.2852   |
|                        | cos1         | 0.9518   | 0.1916   | -0.7207  | -0.9552  | -0.2361  | 0.7366   | 0.9585   |
|                        | Consent      | 1.0000   | 1.0000   | 1.0000   | 1.0000   | 1.0000   | 1.0000   | 1.0000   |
| A68 Concentration      |              | <b>2</b> | <b>2</b> | <b>3</b> | <b>3</b> | <b>2</b> | <b>2</b> | <b>1</b> |
| Concentration          |              | 1        | 1        | 2        | 2        | 2        | 1        | 1        |
| Load in pounds per day |              |          |          |          |          |          |          |          |
|                        | Sum          | 0        | 0        | 1        | 2        | 7        | 9        | 3        |
|                        | A72          | 0        | 0        | 1        | 2        | 8        | 10       | 4        |
|                        | % Difference | 0.49     | 0.09     | -0.06    | -0.09    | -0.12    | -0.14    | -0.14    |
|                        | RPD          | 0.40     | 0.08     | -0.06    | -0.10    | -0.13    | -0.15    | -0.15    |

# dmium Concentration Coefficients

| Bq      | sin      | cos      | sin1     | cos1            | Consent |
|---------|----------|----------|----------|-----------------|---------|
| 0       | 0.32001  | -0.19032 | -0.15579 | <u>-0.48788</u> | 0.000   |
| 1.06168 | 0.13396  | -0.04585 | -0.19308 | <u>-0.24108</u> | 0       |
| 0       | -0.33663 | -0.62245 | -0.47908 | <u>-0.16659</u> | 0       |
| 0       | 0.40996  | 0.28584  | -0.21475 | <u>-0.47368</u> | 0       |

| A   | S   | O   | N  | D  |
|-----|-----|-----|----|----|
| 1   | 1   | 1   | 1  | 1  |
| 268 | 187 | 142 | 92 | 70 |
| 103 | 71  | 53  | 33 | 25 |
| 37  | 26  | 20  | 16 | 14 |
| 122 | 82  | 60  | 38 | 28 |
| 6   | 8   | 9   | 4  | 3  |

|        |        |        |        |        |
|--------|--------|--------|--------|--------|
| 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 0.7087 | 0.7792 | 0.8247 | 0.8824 | 0.9097 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |

|         |         |         |         |         |
|---------|---------|---------|---------|---------|
| -0.6271 | -0.9360 | -0.9878 | -0.7716 | -0.3573 |
| -0.7789 | -0.3521 | 0.1556  | 0.6361  | 0.9340  |
| 0.9769  | 0.6591  | -0.3074 | -0.9816 | -0.6674 |
| 0.2135  | -0.7521 | -0.9516 | -0.1908 | 0.7447  |
| 1       | 1       | 1       | 1       | 1       |

|         |         |         |         |         |
|---------|---------|---------|---------|---------|
| 1       | 1       | 1       | 1       | 1       |
| 1.0000  | 1.0000  | 1.0000  | 1.0000  | 1.0000  |
| -0.6271 | -0.9360 | -0.9878 | -0.7716 | -0.3573 |
| -0.7789 | -0.3521 | 0.1556  | 0.6361  | 0.9340  |
| 0.9769  | 0.6591  | -0.3074 | -0.9816 | -0.6674 |
| 0.2135  | -0.7521 | -0.9516 | -0.1908 | 0.7447  |

**1.2      1.5      1.7      1.4      1.0**

|          |          |          |          |          |
|----------|----------|----------|----------|----------|
| 1        | 1        | 1        | 1        | 1        |
| 0.7087   | 0.7792   | 0.8247   | 0.8824   | 0.9097   |
| -0.6271  | -0.9360  | -0.9878  | -0.7716  | -0.3573  |
| -0.7789  | -0.3521  | 0.1556   | 0.6361   | 0.9340   |
| 0.9769   | 0.6591   | -0.3074  | -0.9816  | -0.6674  |
| 0.2135   | -0.7521  | -0.9516  | -0.1908  | 0.7447   |
| 1.0000   | 1.0000   | 1.0000   | 1.0000   | 1.0000   |
| <b>1</b> | <b>1</b> | <b>1</b> | <b>1</b> | <b>1</b> |

|          |          |          |          |          |
|----------|----------|----------|----------|----------|
| 1        | 1        | 1        | 1        | 1        |
| 1.0000   | 1.0000   | 1.0000   | 1.0000   | 1.0000   |
| -0.6271  | -0.9360  | -0.9878  | -0.7716  | -0.3573  |
| -0.7789  | -0.3521  | 0.1556   | 0.6361   | 0.9340   |
| 0.9769   | 0.6591   | -0.3074  | -0.9816  | -0.6674  |
| 0.2135   | -0.7521  | -0.9516  | -0.1908  | 0.7447   |
| 1.0000   | 1.0000   | 1.0000   | 1.0000   | 1.0000   |
| <b>3</b> | <b>3</b> | <b>3</b> | <b>3</b> | <b>2</b> |

|          |          |          |          |          |
|----------|----------|----------|----------|----------|
| 1        | 1        | 1        | 1        | 1        |
| 1.0000   | 1.0000   | 1.0000   | 1.0000   | 1.0000   |
| -0.6271  | -0.9360  | -0.9878  | -0.7716  | -0.3573  |
| -0.7789  | -0.3521  | 0.1556   | 0.6361   | 0.9340   |
| 0.9769   | 0.6591   | -0.3074  | -0.9816  | -0.6674  |
| 0.2135   | -0.7521  | -0.9516  | -0.1908  | 0.7447   |
| 1.0000   | 1.0000   | 1.0000   | 1.0000   | 1.0000   |
| <b>1</b> | <b>2</b> | <b>2</b> | <b>2</b> | <b>2</b> |

|   |   |   |   |   |
|---|---|---|---|---|
| 1 | 1 | 2 | 2 | 1 |
|---|---|---|---|---|

|       |       |      |      |      |
|-------|-------|------|------|------|
| 2     | 1     | 1    | 1    | 1    |
| 2     | 2     | 1    | 1    | 0    |
| -0.11 | -0.06 | 0.06 | 0.30 | 0.59 |
| -0.12 | -0.06 | 0.06 | 0.26 | 0.45 |

| A72                |          | Prediction Equation Coefficients |           |         |          |        |      |
|--------------------|----------|----------------------------------|-----------|---------|----------|--------|------|
| Chronic TVS at A72 |          | Hardness AluminumCadmium         |           |         |          |        |      |
|                    | a2       | b2                               |           |         |          |        |      |
| Cd                 | -3.49    | 0.7852                           | B         | 0.006   | 1.000    | 0.006  |      |
| Cu                 | -1.7428  | 0.8545                           | Intercept | 82.304  | -26.540  | 1.020  |      |
| Mn                 | 5.8743   | 0.3331                           | BQ        | 200.676 | 5610.562 | 1.466  |      |
| Zn                 | 0.8669   | 0.8473                           | sin       | 16.936  | 158.116  | 0.599  |      |
|                    |          |                                  | cos       | 48.860  | 40.749   | 0.066  |      |
|                    |          |                                  | sin1      | 15.385  | 127.998  | -0.265 |      |
|                    |          |                                  | cos1      | -5.633  | 6.691    | -0.292 |      |
|                    |          |                                  | Consent   |         |          |        |      |
|                    |          |                                  |           |         |          |        |      |
|                    | Month    | J                                | F         | M       | A        | M      | J    |
|                    | Q        | 64                               | 63        | 77      | 155      | 682    | 1196 |
|                    | Hardness | 277                              | 290       | 268     | 196      | 91     | 53   |
|                    | Al ch    | 87                               | 87        | 87      | 87       | 87     | 87   |
|                    | Cd ch    | 2.2                              | 2.3       | 2.1     | 1.7      | 1.0    | 0.6  |
|                    | Cu ch    | 11                               | 11        | 10      | 8        | 4      | 3    |
|                    | Mn ch    | 2317                             | 2352      | 2290    | 2064     | 1598   | 1333 |
|                    | Zn ch    | 279                              | 290       | 271     | 208      | 109    | 68   |

| M 34               |  | Prediction equation coefficients |          |           |           |           |          |     |
|--------------------|--|----------------------------------|----------|-----------|-----------|-----------|----------|-----|
|                    |  | Hardness                         | Aluminum | Cadmium   | Copper    | Iron      | Zinc     |     |
| B                  |  | 0.013                            | 1.00     | 0.021     | 0.123     | 0.06521   | 0.021    |     |
| Intercept          |  | 60.05228                         | 15.10361 | 0.91724   | 14.65129  | 77.70523  | 05.25873 |     |
| BQ                 |  | 05.02801                         | 38.29032 | 0.60966   | 00.98354  | 70.29706  | 78.11589 |     |
| sin                |  | 9.24827                          | 69.03843 | 0.26911   | 14.16661  | 89.38888  | 88.77920 |     |
| cos                |  | 32.30173                         | 79.08681 | 0.20991   | 10.17487  | 38.04002  | 85.94018 |     |
| sin1               |  | 435.43127                        | -0.12214 | 1.04278   | 86.24646  | -17.99615 |          |     |
| cos1               |  | 123.10453                        | -0.14689 | -3.82920  | -12.30367 | -45.60154 |          |     |
| consent            |  | -265.10754                       |          | -10.75402 | 35.80515  | -98.00378 |          |     |
|                    |  |                                  |          |           |           |           |          |     |
| MONTH              |  | J                                | F        | M         | A         | M         | J        | J   |
| Q                  |  | 22                               | 22       | 28        | 58        | 266       | 468      | 243 |
| Hardness           |  | 255                              | 241      | 226       | 170       | 86        | 60       | 76  |
| Chronic StanAl, ch |  | 87                               | 87       | 87        | 87        | 87        | 87       | 87  |
| Cd, ch             |  | 2.1                              | 2.0      | 1.9       | 1.5       | 0.9       | 0.7      | 0.8 |
| Cu ch              |  | 20                               | 19       | 18        | 14        | 8         | 6        | 7   |

|       |      |      |      |      |      |      |      |
|-------|------|------|------|------|------|------|------|
| Mn    | 2253 | 2212 | 2163 | 1969 | 1571 | 1389 | 1504 |
| Zn ch | 260  | 248  | 235  | 185  | 104  | 76   | 93   |

#### A68 Animas at Silverton

|            |          | Prediction equation coefficients |         |        |           |          |      |
|------------|----------|----------------------------------|---------|--------|-----------|----------|------|
|            |          | Hardness                         | Cadmium | Copper | Manganese | Zinc     |      |
| B          |          | 0.011na                          | na      | 0.010  | 0.016     |          |      |
| Intercept  |          | 37.945                           | 2.395   | 5.783  | 258.473   | 304.617  |      |
| BQ         |          | 165.600                          |         |        | 1371.923  | 644.136  |      |
| sin        |          |                                  | 1.712   | 2.049  | 611.024   | 315.451  |      |
| cos        |          |                                  | 0.140   | 0.729  | 81.662    | -18.603  |      |
| sin1       |          |                                  | -0.250  | -1.520 | 16.031    | -33.783  |      |
| cos1       |          |                                  | -1.185  | -0.472 | -263.628  | -140.108 |      |
| May        |          |                                  | -1.936  | 2.261  | -258.699  |          |      |
| consent    |          |                                  | -0.714  | -1.828 | 411.428   | -67.174  |      |
| Animas R   | Month    | J                                | F       | M      | A         | M        | J    |
|            | Q        | 25                               | 25      | 31     | 66        | 329      | 585  |
|            | Hardness | 168                              | 168     | 161    | 134       | 74       | 60   |
|            | Cd, tvs  | 1.5                              | 1.5     | 1.5    | 1.3       | 0.8      | 0.7  |
|            | Cu tvs   | 14                               | 14      | 13     | 11        | 7        | 6    |
|            | Mn tvs   | 1959                             | 1961    | 1934   | 1818      | 1491     | 1393 |
| onic stand | Zn tvs   | 182                              | 183     | 177    | 151       | 91       | 77   |
|            |          |                                  |         |        |           |          | 94   |



# Reaction Equation Coefficients

| Copper  | Iron     | Zinc    |      |      |  |
|---------|----------|---------|------|------|--|
| 0.100   | 0.048    | 0.014   |      |      |  |
| 11.592  | 325.430  | 272.266 |      |      |  |
| -11.516 | 6156.248 | 697.432 |      |      |  |
| 5.618   | 310.323  | 155.229 |      |      |  |
| 5.955   | 262.025  | 37.490  |      |      |  |
| 1.700   | -72.066  | -37.359 |      |      |  |
| -0.594  | -177.065 | -77.421 |      |      |  |
| -1.491  |          |         |      |      |  |
|         |          |         |      |      |  |
| A       | S        | O       | N    | D    |  |
| 268     | 187      | 142     | 92   | 70   |  |
| 124     | 158      | 182     | 215  | 248  |  |
| 87      | 87       | 87      | 87   | 87   |  |
| 1.2     | 1.4      | 1.6     | 1.8  | 2.0  |  |
| 5       | 7        | 7       | 9    | 10   |  |
| 1772    | 1920     | 2013    | 2129 | 2233 |  |
| 141     | 173      | 195     | 225  | 255  |  |

|    | Acute TVS at M34 |        | Chronic TVS at M34 |        |
|----|------------------|--------|--------------------|--------|
|    | a2               | b2     | a3                 | b3     |
| Cd | -3.828           | 1.128  | -3.49              | 0.7852 |
| Cu | -0.7703          | 0.9422 | -1.7428            | 0.8545 |
| Mn | 4.4995           | 0.7893 | 5.8743             | 0.3331 |
| Zn | 0.8904           | 0.8473 | 0.8669             | 0.8473 |

| A   | S   | O   | N   | D   |
|-----|-----|-----|-----|-----|
| 103 | 71  | 53  | 33  | 25  |
| 126 | 151 | 192 | 217 | 253 |
| 87  | 87  | 87  | 87  | 87  |
| 1.2 | 1.4 | 1.7 | 1.8 | 2.0 |
| 11  | 13  | 16  | 17  | 20  |

|      |      |      |      |      |
|------|------|------|------|------|
| 1783 | 1892 | 2050 | 2136 | 2246 |
| 144  | 167  | 205  | 227  | 258  |

| Chronic TVS at A68 |         |        |      |      |      |
|--------------------|---------|--------|------|------|------|
|                    | a2      | b2     |      |      |      |
| Cd                 | -3.49   | 0.7852 |      |      |      |
| Cu                 | -1.7428 | 0.8545 |      |      |      |
| Mn                 | 5.8743  | 0.3331 |      |      |      |
| Zn                 | 0.8669  | 0.8473 |      |      |      |
|                    |         |        |      |      |      |
|                    | A       | S      | O    | N    | D    |
|                    | 122     | 82     | 60   | 38   | 28   |
|                    | 109     | 125    | 138  | 155  | 165  |
|                    | 1.1     | 1.2    | 1.3  | 1.4  | 1.5  |
|                    | 10      | 11     | 12   | 13   | 14   |
|                    | 1695    | 1777   | 1836 | 1908 | 1947 |
|                    | 126     | 142    | 155  | 171  | 180  |